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Bardehle - Pagenberg - Dost - Altenburg -
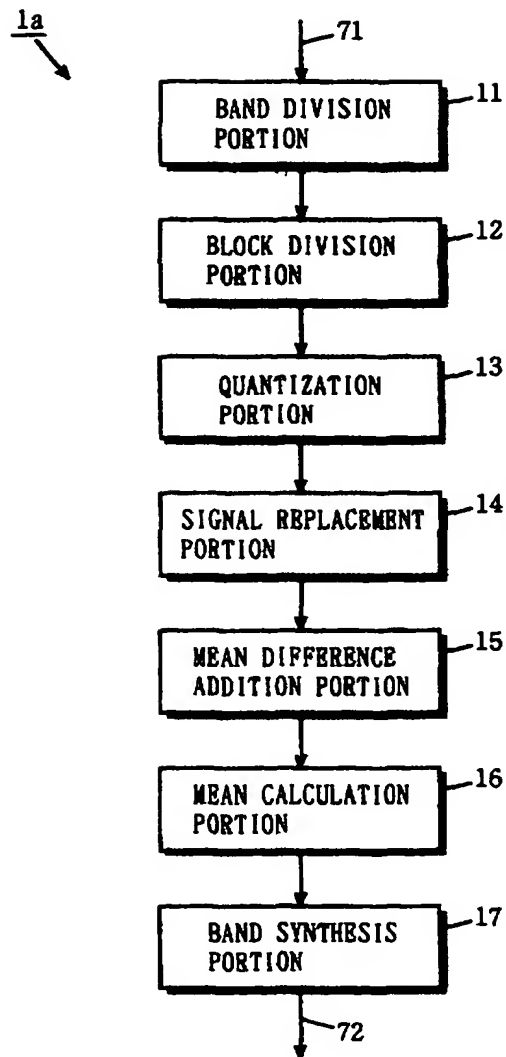Geissler - Isenbruck,
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(54)   **Apparatus for and method of embedding and extracting digital information and medium having program for carrying out the method recorded theron**

(57)   A band division portion 11 receives an image signal 71, and divides the image signal 71 into 10 frequency bands by discrete wavelet transform, to calculate transform coefficients. A block division portion 12 divides an LL3 signal obtained by the division into a plurality of blocks previously determined. A quantization portion 13 finds for each of the blocks a mean value M of the transform coefficients, and subjects M to linear quantization using a quantization step-size Q previously determined, to calculate a quantization value q. A signal replacement portion 14 replaces q with q' on the basis of the value of digital information to be embedded. A mean difference addition portion 15 subjects q' to inverse linear quantization using Q, to find a mean value M', calculates a difference DM between M' and M, and adds the difference to the transform coefficients in the block. A mean calculation portion 16 calculates a mean value LM of the transform coefficients after the addition. A band synthesis portion 17 synthesizes the LL3 signal which has been subjected to the embedding processing and a signal in the other frequency band, to reconstruct

an image signal 72. Further, the band division portion 11 receives a digitized image signal 71, and divides the image signal 71 into 10 frequency bands by discrete wavelet transform, to calculate transform coefficients. A map information generation portion 52 generates, with respect to one of the 10 frequency bands, map information indicating whether or not the absolute amplitude values of all the transform coefficients in the same space representation region in the same direction of division as the frequency band are not more than a set value R. A signal replacement portion 53 refers to the value of each of the transform coefficients in the map information, and replaces, when the value of the transform coefficient is not more than the set value R, the value with another value in accordance with the digital information to be embedded. A band synthesis portion 17 synthesizes signals in the 10 frequency bands each including the replaced transform coefficients, to reconstruct an image signal 75.

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71

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BAND DIVISION        11
PORTION

    ↓

BLOCK DIVISION       12
PORTION

    ↓

QUANTIZATION         13
PORTION

    ↓

SIGNAL REPLACEMENT   14
PORTION

    ↓

MEAN DIFFERENCE      15
ADDITION PORTION

    ↓

MEAN CALCULATION     16
PORTION

    ↓

BAND SYNTHESIS       17
PORTION
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European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 98 12 0637

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
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A	EP 0 766 468 A (NIPPON ELECTRIC CO) 2 April 1997 (1997-04-02) * the whole document * ---	1-99	
A	RUANAIDH J J K O ET AL: "PHASE WATERMARKING OF DIGITAL IMAGES" PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON IMAGE PROCESSING (ICIP) LAUSANNE, SEPT. 16 - 19, 1996, NEW YORK, IEEE, US, vol. 3, 16 September 1996 (1996-09-16), pages 239-242, XP000199952 ISBN: 0-7803-3259-8 * Section 1. Watermarking * -----	1-99	TECHNICAL FIELDS SEARCHED (Int.Cl.6) H04N G06T

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 August 2001	Hazel, J

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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